

CLAIMS

1. Chemical reaction apparatus comprising in combination:
 - (a) first means for forming a stream of first matter and flowing said stream in a given direction along a predetermined path,
 - (b) second means for generating a beam of collimated coherent radiation,
 - (c) third means for directing said collimated radiation beam along a path to intersect said stream of matter and to transfer sufficient energy of said beam to a quantity of said matter to effect a chemical change in said matter,
 - (d) fourth means for controlling the conveyance of matter from said stream after it has been reacted on by said beam to dispose the products of reaction at a predetermined location.
2. Chemical reaction apparatus in accordance with claim 1 wherein said first means is operable to direct said beam at an angle to said path of said matter.
3. Chemical reaction apparatus in accordance with claim 1 wherein said third means is operable to direct said beam parallel to an along said stream of said first matter.
4. Chemical reaction apparatus in accordance with claim 1 including fifth means for forming a stream of second matter different from said first matter to intersect said stream of said first matter upstream of the point where said beam intersects said matter so as to permit said beam to react on the mixture of said first and second matter.
5. Chemical reaction apparatus in accordance with claim 1 including fifth means for forming a stream of second matter different from said first matter to intersect said stream of said first matter at the location where said beam intersects said matter so as to permit said second matter to combine with said first matter and to partake in the reaction effected by said beam of collimated radiation.

6. Chemical reaction apparatus in accordance with
claim 1 including fifth means for controlling the formation and
flow of said stream of matter, sixth means for controlling said
second means to generate said beam of coherent radiation and
master control means connected to said fifth and sixth means
to predeterminately control the chemical reaction effected by said
beam when it reacts on the matter flowing in said stream.

7. Chemical reaction apparatus in accordance with
claim 6 wherein said sixth means is operable to control said
second means to generate pulses of coherent beam radiation which
are intermittently directed to intersect said stream of matter,
said master control means being operable to control the timing of
the pulses generated by controlling operation of said sixth
means.

8. Chemical reaction apparatus in accordance with
claim 4 including sixth and seventh means for respectively con-
trolling the operation of said first and fifth means in forming
said streams of said first and second matter and master control
means connected to predeterminately control the operation of said
sixth and seventh means in effecting a chemical reaction.

9. Chemical reaction apparatus in accordance with
claim 1 wherein said first means is operable for forming and
flowing a stream of gas defining ^{at least part of} said first matter.

10. Chemical reaction apparatus in accordance with
claim 1 wherein said first means is operable to form said
stream of matter consisting of a fluid such as a gas or vapor
having particles of matter disposed therein.

11. Chemical reaction apparatus in accordance with
claim 1 wherein said first means is operable to intermittently
form and direct said stream along said predetermined path.

12. A method of creating a chemical reaction comprising:

controllably directing a stream of fluent material along a select path, which path intersects a reaction zone, so as to present molecules of said fluent material as a flow thereof through said reaction zone, and

as said fluent material passes through said reaction zone, generating and directing a collimated beam of intense radiation along a path which intersects said reaction zone such that radiation of said beam passes through said reaction zone while molecules of said fluid pass through said zone so as to transfer sufficient radiation from said beam at said reaction zone to said fluid to cause a chemical reaction involving the molecules of said fluid at said reaction zone.

13. A method in accordance with Claim 12 wherein said fluid is flowed as a steady stream to and through said reaction zone.

14. A method in accordance with Claim 13 wherein said radiation beam is generated over a prolonged period of time while fluid is flowing.

15. A method in accordance with Claim 12 wherein said fluid is flowed intermittently to said reaction zone.

16. A method in accordance with Claim 15 wherein said radiation beam is generated intermittently in a manner to intersect separate quantities of said fluid intermittently passed through said reaction zone.

17. A method of creating a chemical reaction comprising:

- a) generating a beam of collimated radiation having sufficient intensity and energy for effecting a reaction with respect to particles of matter when said beam is caused to intersect said particles and directing said beam along a select path,
- b) controllably flowing a stream of fluent material containing particles of matter along at least a portion of the select path along which said beam is directed such that radiation of said beam will be transferred to particles of said matter during a substantial portion of the travel of said particles along said select path, and
- c) causing radiation of said collimated beam to react on said particles in said stream as said particles travel said select path and to change the state of said particles.

18. A method in accordance with claim 17 wherein said particles are solid particles of matter and said beam of collimated radiation serves to vaporize the matter of said particles, further including effecting a chemical reaction between constituents of said stream of fluent material including said vaporized material formed of said particles.

19. A method in accordance with claim 17 wherein said particles in said stream comprise a mixture of different chemicals and wherein a chemical reaction is effected between said different chemicals when said radiation beam is directed against said particles in said stream.

20. A method in accordance with claim 17 wherein said radiation beam is directed through the center of said stream, said beam is deflected to scan within said stream and said beam and the material of said stream are directed against a surface of a solid material and caused to react with at least a portion of said solid material.